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Teaching reading strategies and reading comprehension within a technology-enhanced learning environment

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Abstract

Research conducted in South Africa indicates that many South African students who register for undergraduate study each year are under-prepared for university education and that many of these students also have low levels of reading ability. This has an adverse effect on their chances of academic success. In order to meet the reading needs of students in the 21st century, educators are pressed to develop effective instructional means for teaching reading comprehension and reading strategy use. This paper outlines the format and structure of a strategic reading instruction component of an English for Professional Purposes course offered within a technology-enhanced environment. The results indicated that students who received strategic reading instruction in this environment received both statistically and practically significantly higher marks on three reading comprehension measures than did the students in the control group. This was true for successful students, as well as for those considered to be at risk. Published by Elsevier Ltd.

Keywords: Reading; Strategies; Comprehension; Technology-enhanced; English Second Language; At-risk learners; Online learning; Strategy instruction; Reading instruction

1. Introduction

One of the most serious problems in higher education, but one which is often not recognized by either students or lecturers until some way into academic courses, is the problem of reading, perhaps because reading per se is not assessed. However, the results or outputs from reading *are* assessed.

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Levine et al. (2000, p. 1) state: “The ability to read academic texts is considered one of the most important skills that university students of English as a Second Language (ESL) and English as a Foreign Language (EFL) need to acquire”. Reading comprehension has come to be the “essence of reading” (Durkin, 1993), essential not only to academic learning in all subject areas but also to professional success and, indeed to lifelong learning (Pritchard et al., 1999; Rings, 1994; Strydom, 1997). However, many students enter higher education underprepared for the reading demands that are placed upon them. When pressed to read, they often select ineffective and inefficient strategies with little strategic intent (cf. Saumell et al., 1999; Wade et al., 1990; Wood et al., 1998). Often this is due to their low level of reading strategy knowledge and lack of metacognitive control (Dreyer, 1998; Strydom, 1997; Van Wyk, 2001). Another reason might be their inexperience coming from the limited task demands of high school and the fact that at the first-year level at the Potchefstroom University 50% of the focus is still on knowledge reproduction.

This might not be so surprising when one considers that research conducted by Durkin (1979) revealed that teachers actually devoted only 2% of the classroom time designated for reading instruction to teaching students how to comprehend what they read. Twenty years later, not much seems to have changed (cf. Pressley et al., 1998). The situation in South Africa is not any different; in high school, reading comprehension instruction is limited to the assignment of a reading passage, accompanied by a number of short or multiple-choice questions relating to the passage (personal experience and observation). Even at the university level, it is often assumed that students have the skills and strategies needed to successfully comprehend expository text. Yet, there is little evidence to suggest that students at any level will acquire these skills and strategies if they have not been explicitly taught (Carrell, 1998).

Instruction can be effective in providing students with a repertoire of strategies that promote comprehension monitoring and foster comprehension. For students to become motivated strategic strategy users, they need “systematically orchestrated instruction or training” (Alexander, 1996, p. 90). In order to meet the reading needs of students within the 21st century, educators are pressed to develop effective instructional means for teaching reading comprehension and reading strategy use (Kasper, 2000a, b; Singhal, 2001; Van Wyk, 2001). The purpose of this article is, therefore, to address the following research questions: (a) What does the reading comprehension and reading strategy use profile of first-year students at Potchefstroom University look like? (b) Did the students in the experimental group who completed the strategic reading component of the English for Professional Purposes course in a technology-enhanced environment attain statistically and practically significantly higher mean scores on their end-of-semester English, Communication and TOEFL reading comprehension tests, and did they differ significantly in terms of their reading strategy use?

2. Strategic reading instruction within a technology-enhanced environment

A number of South African institutions (e.g., Potchefstroom University for CHE, Rand Afrikaans University, University of Pretoria and the University of South

Africa) are using information and communication technologies (e.g., the internet) for the first time as part of the teaching and learning process (cf. Dreyer, 2001; Grobler and Henning, 2001; Jordaan, 2001; Heydenrych, 2001). A decision by the Senate of the Potchefstroom University for CHE in 1998, namely that: “The PU for CHE wants to offer, with flexible learning (which encompasses all learning environments), cost-effective and accessible higher educational programmes of high quality in a learner-centred approach” and that “the judicious use of information technology will play an important role in reaching this objective” (Volschenk, 2002) has paved the way for the development of a number of courses offered within a technology-enhanced environment.

However, as Chun and Plass (2000, p. 152) point out, “the use of a networked environment for learning in general and for second language acquisition in particular raises many questions regarding the design of these environments that differ from the traditional design of text-based and stand-alone systems”. On the one hand, there are numerous reasons in favour of integrating the Internet into a language curriculum (cf. Chun and Plass, 2000, p. 161), and on the other hand, several arguments can be made that ask for a more cautious approach when using the Internet (Brandl, 2002, p. 88).

Within the English for Professional Purposes course, offered at the Potchefstroom University, the strategic reading instruction component consisted of the following: a printed interactive study guide, contact sessions (face-to-face), and the technology-enhanced feature, namely Varsite (i.e., a Learning Content Management System). Varsite was designed and developed by computer specialists at Potchefstroom University. The aim of this format was to try to ensure that we accommodated the learning style preferences of the majority of the students taking this course.

2.1. Interactive study guides

At Potchefstroom University printed interactive study guides are compulsory for all full time courses on campus. The authors of the strategic reading study guide tried to obtain a balance among three aspects: (1) the core information (i.e., the content on strategic reading), (2) the tasks and activities for learners to actively interact with the various sections of the module in order to develop the application of knowledge and skills in terms of the outcomes, and (3) encouragement of learners to manage their own learning (cf. Harden et al., 1999; Van der Merwe et al., 2002).

The major focus in the study guide was on explaining the main features of a particular strategy and explaining why that strategy should be learned (i.e., the potential benefits of use). The benefit of use was linked to students’ reading profiles. In this way, students could see the necessity of reading strategy use, as well as the link to their reading comprehension ability. Appendix contains an outline of the content of the study guide, as well as the outcomes formulated for the strategic reading component. In the study guide, the following aspects formed a minor focus: (1) how to use the strategy, (2) when and where the strategy should be used, and (3) how to evaluate the use of the strategy (Anderson, 1991; Paris et al., 1984; Winograd and Hare, 1988). The study guide, therefore, contained sufficient explanation about strategic reading, but only a few practice activities.

2.1.1. *Contact sessions*

The purpose of the contact sessions was to give the students additional information on the strategies, to model the strategies for the students, and to provide practice opportunities both individually and in groups. During the first two sessions, the students were given information on the importance of motivation, anxiety, and time management because of the important role these variables play in language learning (cf. Dreyer, 1995; Dreyer and Oxford, 1996; Oxford and Ehrman, 1993). In addition, the students and the lecturers brainstormed on reading strategies, and they discussed their prior experience with the use of reading strategies and the rationale for using them. At first, the discussion was linked to general topics (e.g., reading magazines, short stories, cookbooks, maps, etc.) and then specifically to content in their major (e.g., mass communication, non-verbal communication, communication theories, etc.).

During the contact sessions, a brief overview was given of what a strategy is and why it should be used (i.e., minor focus). The major focus during the contact sessions was on how to use the strategies, when and where to use them, and how to evaluate their use of the (cf. Anderson, 1991; Paris et al., 1984; Winograd and Hare, 1988). The authors tried to build from the student's understanding of whatever strategies he/she was currently using to placing these strategies in question by testing their validity against the task demands placed upon them by higher education. During the course of the 13-week semester, the students were given the opportunity to practice with simple sentences, then with paragraphs, then with a variety of genres, and lastly, with the content of their major (i.e., Communication Studies). Students were also shown how to set a purpose for their reading and how to approach the reading of different texts (e.g., narrative versus expository).

2.1.2. *Varsite*

Varsite is a Learning Content Management System (LCMS). A LCMS is a multi-user environment where lecturers can create, store, reuse, manage, and deliver digital learning content from a central object repository. A LCMS contains four basic elements: (1) a dynamic delivery interface (providing links to related sources of information, resources, the electronic study guide, and supports assessment with user feedback), (2) an automated authoring system (used to create the reusable learning objects that are accessible in the repository), (3) an administrative system (used to manage student records, track and report student progress, and provide other basic administrative functions), and (4) the learning object repository (serving as a central database in which learning content is stored and managed, and made accessible to the learners). The delivery interface and homepage of the strategic reading component of the English for Professional Purposes course is given at Fig. 1.

The students had access to the following features within the Varsite environment: (1) electronic study guide, (2) announcement section, (3) assignment and resource section, (4) assessment section, and (5) interaction with peers and instructors. Each of these is described below.

The electronic study guide differed from the printed interactive study guide in that it contained only the main points of emphasis on the reading process and the various

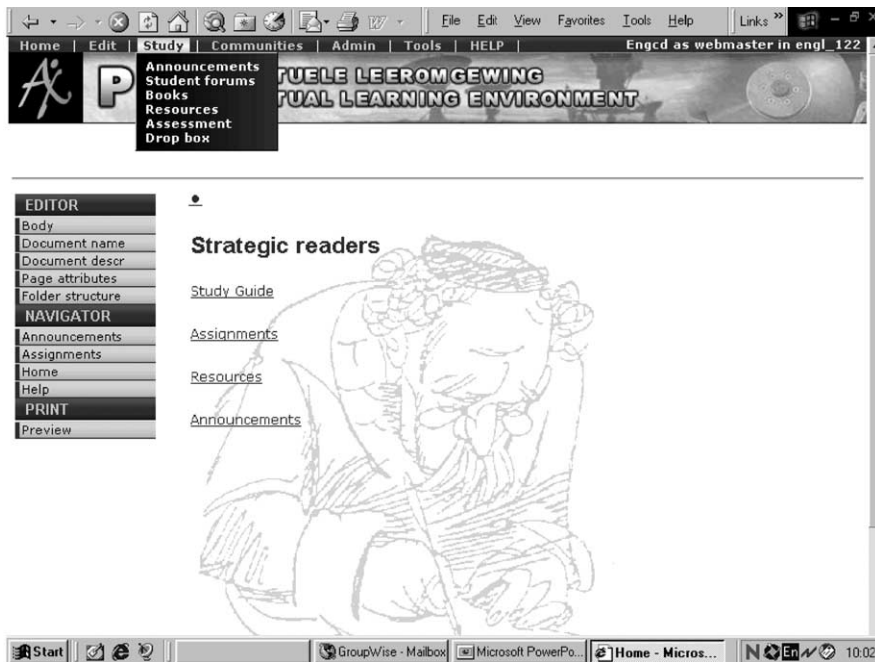


Fig. 1. Delivery interface and homepage of the strategic reading instruction component.

reading strategies. It did not contain detailed explanations or examples. The purpose of the electronic study guide was to provide a quick reference for students while they were completing tasks that required them to follow a number of hyperlinks. For example, if the students wanted to know about text structure they could simply click on study guide link and they would be taken to the relevant page in the electronic study guide.

The second feature was the announcement section. Here, the lecturers informed the students on a daily basis of assignments that had to be completed as well as due dates.

In the assignment and resource section students were given a detailed outline of the tasks to be completed; the resource section contained two sub-sections, one on general topics and one specifically for Communication Studies. The resource section also contained a number of hyperlinks that were updated on a weekly basis to ensure that students had access to a plethora of information on the specific topics being discussed in their Communication Studies class. The English lecturers coordinated their teaching schedules with that of the Communication Studies lecturer. During the first 7 weeks of the semester, the lecturers provided the students with a variety of generic topics (e.g., current news, music, business reports, etc.), as well as a number of hyperlinks (i.e., scaffolding) that they had to use in order to gain access to the information needed for the completion of the tasks. During the last 6 weeks of the semester, the students were allowed to “surf” the Internet on their own, with only limited guidance from the lecturers, in order to find the information needed to complete the assignments. The assignments focussed on the use of reading strategies

(e.g., predict what information the following website will contain; formulate a number of questions you want answered after reading an article on non-verbal communication, etc.).

The fourth feature, the assessment section, was used in order to set a number of online practice assessments. Students had to make use of a variety of reading strategies in order to complete the assessments (e.g., identify the purpose of a selected piece of text, identify the main idea, make inferences, predict, formulate questions, summarise, etc.).

The fifth feature was interaction with fellow students and also with the lecturers. This was accomplished via email.

In general, the Varsite environment exposed students to a variety of authentic information that increased their background knowledge and comprehension of topics they were also discussing in their Communication Studies class (e.g., small groups, conflict in small groups, etc.). Some of the sites included video and audio clips (e.g., interviewing, negotiation skills, etc.). Initially, the activities and tasks were lecturer-guided, but as the students gained confidence, they were allowed to make their own choices. The rationale for using selected readings from the Internet was to surpass what the lecturers could offer in the contact sessions.

3. Research method

3.1. Design

A quasi-experimental non-randomized control group design was used.

3.2. Participants

All first-year English as a Second Language (ESL) students ($n=131$) taking the English for Professional Purposes course participated in this study. The participants included speakers of Afrikaans and Setswana majoring in Communication Studies. Within the experimental and control groups, the students were divided into two additional groups, namely successful and unsuccessful or “at risk” for failure. The students were divided into these two groups based on their scores for reading comprehension tests in English, Communication Studies and the TOEFL. All those students who obtained percentages below 55% were categorised as “at risk,” whereas the students who obtained percentages above 55% were categorised as “successful”.

3.3. Instrumentation

The following instruments were used in this study:

- A Reading Strategies Questionnaire, based on the work of Oxford (1990), Pressley and Afflerbach (1995), Pressley et al. (1995) and Wyatt et al. (1993), was used to determine students’ use of reading strategies.

- The TOEFL test was administered to determine the English proficiency of the students. The test consists of three sections that are separately timed: Listening comprehension, Structure and Written expression and Vocabulary and Reading comprehension (reliability analyses $r = 0.96$ for total scores, $N = 215$).
- Two reading comprehension tests, one within Communication Studies (drawn up in consultation with the lecturer teaching the specific Communication module) and one within the English for Professional Purposes course, were used as a pre-test together with the reading comprehension section of the TOEFL in order to classify the students as “at risk” of failure or as “successful”. Similar tests were used for posttest purposes.

With regard to the reading comprehension tests, a combination of multiple-choice and short answer comprehension questions designed to tap higher-order reading skills were prepared (e.g., relating information, generalising, noting similarities, differences and contradictions, paraphrasing, making applications and cause-effect relationships). The lengths of the English reading comprehension passages were much shorter than that of the Communication Studies reading comprehension passages. For the Communication reading comprehension test, articles used by the lecturer in the Communication Studies course provided students with the opportunity to read specific content material in a format that they would encounter in their Communication Studies course.

3.4. *Data collection procedure*

The questionnaires were completed in scheduled contact session periods within the first 2 weeks of the second semester of 2002. All questionnaires were completed under testing conditions. The TOEFL test was completed under testing conditions as specified by Educational Testing Services. All background information on the students was obtained from the university academic administration.

3.5. *Analysis*

T-tests were used to determine if there were differences in the mean scores of first-year students on selected variables. Cohen’s effect size d was used to determine if the mean differences were practically significant. Cohen (1977) uses the following scale for the d values:

$d = 0.2$ (small effect size)

$d = 0.5$ (medium effect size)

$d = 0.8$ (large effect size)

4. Results

An analysis of the reading comprehension scores (pretest) of the students in the experimental and control groups indicated that there was not a statistically significant

difference in their mean scores on any of the reading comprehension measures (cf. Table 1). The language proficiency scores, as measured by the TOEFL, of the students in both groups ranged from 400 to 599. These scores indicate that some of the students' proficiency levels can be considered to be too low for academic work (cf. Educational Testing Service, 1989, p. 14). A closer analysis of the TOEFL scores indicated that the at-risk students in this study achieved the lowest score in the reading section of the TOEFL test. This is a major cause for concern, especially when one considers that students need to read and comprehend a large number of academic texts.

In the English for Professional Purposes course offered at Potchefstroom University, 30.53% of the students enrolled in this course were identified as being “at risk” for failure or unsuccessful (cf. Section 4.2). The mean pretest reading comprehension scores, on the English, Communication and the reading section of the TOEFL test, for the at-risk students were all below 55% (cf. Table 2). The results indicated that the at-risk students differed statistically ($P < 0.0001$), as well as practically significantly ($d \geq 0.8$) (cf. Table 2), from the successful students on all the reading comprehension measures.

In terms of reading strategy use (pretest), the results indicated that there was not a statistically significant or a practically significant difference in the reading strategies used by the students in the experimental and control groups (cf. Table 3). The posttest results, however, indicated that the students in the experimental group used certain strategies statistically ($P < 0.05$), as well as practically significantly (small to large effect sizes), more often than the successful students (cf. Table 3).

From the results presented above, it seems clear that the first-year students in this study who have problems with reading comprehension and don't use reading strategies optimally and strategically come unprepared for the academic literacy requirements that typically characterise university coursework (cf. Pugh et al., 2000),

Table 1
The reading comprehension profile of first-year students: experimental group vs. control group

Variables	Experimental (Pretest) ($N = 89$)		Control (Pretest) ($N = 42$)		Experimental (Posttest) ($N = 89$)		Control (Posttest) ($N = 42$)		P	d
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.		
English reading comprehension	58.40	6.25	57.07	4.44	64.73	6.18	59.23	5.52	***	0.89
Communication reading comprehension	57.95	5.52	56.23	2.63	63.13	6.65	57.92	3.54	***	0.78
TOEFL reading comprehension	25.19	6.17	25.85	4.90	31.85	6.03	27.02	4.89	***	0.80
TOEFL total (Score range)	400–599		400–599							

Practical significance: $d = 0.2$ (small effect size); $d = 0.5$ (medium effect size); $d = 0.8$ (large effect size).

*** $P < 0.0001$.

and that may very well be a part of their upcoming job responsibilities (cf. Department of Education, 1997).

An analysis of the strategies that discriminated between the students revealed that there was a difference in terms of the processes that occurred before reading, during reading, and after reading (cf. Caverly et al., 2000). The successful students in this study were active during all three phases of reading (posttest). Only the strategies where significant differences occurred are reported (cf. Table 4). The strategy use of the at-risk students, on the other hand, indicated that they lack sufficient, efficient, and effective strategically orchestrated use of the necessary higher order processes (i.e., metacognitive strategies), which would enable them to assess the different reading tasks and bring to bear the necessary strategies for their completion. The at-risk students mainly used metacognitive strategies that related to planning, whereas the successful students also seemed to monitor and evaluate their learning and reading comprehension. The successful readers, as reflected by the reading comprehension scores, were goal-directed, dealt with comprehension difficulties at several levels of analysis, and worked explicitly towards creating and retaining a lasting representation of the important points of the text.

After participating in a 13-week strategic reading instruction module offered in a technology-enhanced environment the following results were obtained:

- The experimental group differed statistically, as well as practically significantly, from the control group on all the reading comprehension measures (posttest scores) (cf. Table 1).
- Similarly, the successful students also differed statistically, as well as practically significantly, from the at-risk students on all the reading comprehension measures (posttest scores) (cf. Table 2).

Table 2

The reading comprehension profile of first-year students: successful vs. at risk

Variables	Success (Pretest) (<i>N</i> = 91)		At risk (Pretest) (<i>N</i> = 40)		<i>P</i>	<i>d</i>	Success (Posttest) (<i>N</i> = 91)		At risk (Posttest) (<i>N</i> = 40)		<i>P</i>	<i>d</i>
	M	S.D.	M	S.D.			M	S.D.	M	S.D.		
English reading comprehension	60.54	4.34	52.12	4.01	***	1.94	65.56	5.51	57.07	4.38	***	1.54
Communication reading comprehension	59.40	4.27	52.85	2.35	***	1.53	63.82	5.70	56.10	3.93	***	1.35
TOEFL reading comprehension	28.21	2.98	19.00	5.52	***	1.67	32.98	4.47	24.20	4.81	***	1.82
TOEFL total (Score range)	500–599		400–499									

Practical significance: $d = 0.2$ (small effect size); $d = 0.5$ (medium effect size); $d = 0.8$ (large effect size).

*** $P < 0.0001$.

Table 3

The reading strategy use profile of first-year students: experimental vs. control

Variables	Experimental (Pretest) (<i>N</i> = 91)		Control (Pretest) (<i>N</i> = 40)		Experimental (Posttest) (<i>N</i> = 91)		Control (Posttest) (<i>N</i> = 40)		<i>P</i> <i>d</i>	
	M	S.D.	M	S.D.	M	S.D.	M	S.D.		
I briefly skim the text before reading.	2.97	0.67	2.99	0.56	3.68	0.71	3.04	0.68	*	0.90
I skim/scan to get the main idea.	2.99	0.75	3.02	0.71	3.52	0.79	3.29	0.71	*	0.30
I pay greater attention to important information than other information.	2.67	0.54	2.66	0.56	3.04	0.78	3.01	0.63		
I try to relate the important points in the text to one another in an attempt to understand the entire text.	2.36	0.64	2.43	0.65	3.80	0.66	2.78	0.54	*	1.88
I generate questions about the text.	1.78	0.70	1.70	0.68	3.58	0.64	2.86	0.63	*	1.13
While I am reading, I reconsider and revise my prior questions about the text based on the text's content.	2.23	0.54	2.17	0.56	2.93	0.57	2.43	0.60	*	0.83
While I am reading, I reconsider and revise my background knowledge about the subject based on the text's content.	1.74	0.56	1.80	0.60	3.00	0.64	2.97	0.63		
I plan how I am going to read a text.	2.10	0.68	2.07	0.64	3.62	0.58	3.32	0.59	*	0.51
I often look for how the text is organised and pay attention to headings and sub-headings	2.54	0.76	2.49	0.72	3.09	0.75	3.05	0.78		
I usually make predictions as to what will follow next.	1.98	0.50	2.00	0.54	2.78	0.56	2.02	0.53	*	1.36
While I am reading, I try to determine the meaning of unknown words that seem critical to the meaning of the text.	2.02	0.48	2.10	0.52	3.02	0.67	2.97	0.76		
I try to underline when reading in order to remember the text.	3.45	0.76	3.39	0.70	3.80	0.66	3.85	0.70		
I read material more than once in order to remember the text.	3.10	0.68	2.98	0.74	3.30	0.78	3.32	0.59		
I make notes when reading in order to remember the text.	2.68	0.65	2.60	0.70	3.00	0.64	2.97	0.63		
When appropriate, I try to visualize the descriptions in the text that I am reading in order to remember the text.	2.14	0.53	2.19	0.59	3.37	0.53	3.12	0.48	*	0.47

(continued on next page)

Table 3 (continued)

Variables	Experimental (Pretest) (<i>N</i> = 91)		Control (Pretest) (<i>N</i> = 40)		Experimental (Posttest) (<i>N</i> = 91)		Control (Posttest) (<i>N</i> = 40)		<i>P</i> <i>d</i>	
	M	S.D.	M	S.D.	M	S.D.	M	S.D.		
I summarize/paraphrase the material that I am reading in order to remember the text.	3.54	0.64	3.57	0.65	3.62	0.58	3.59	0.56		
When reading, I ask myself questions about the text content to better remember the text.	2.00	0.45	1.99	0.50	3.45	0.75	2.97	0.76	*	0.63
When I think that I am not comprehending a text, I change my reading strategies (e.g. re-reading).	2.41	0.69	2.37	0.71	3.82	0.68	3.48	0.63	*	0.50
As I am reading, I evaluate the text to determine whether it contributes to my knowledge/understanding of the subject.	2.32	0.52	2.34	0.54	3.44	0.56	3.38	0.57		
After I have read a text, I review it.	3.34	0.62	3.39	0.69	3.42	0.53	3.34	0.55		
After I have read a text, I try to interpret what I have read.	2.89	0.76	2.80	0.79	3.58	0.64	3.37	0.57	*	0.32
After I have read a text, I evaluate what I have read.	2.35	0.67	2.20	0.69	3.80	0.68	3.43	0.71	*	0.52
While reading, I jump forward and/or backward in the text to find the important information.	2.10	0.49	2.16	0.53	3.52	0.76	3.37	0.57	*	0.20
While reading, I distinguish between information I already know and new information.	1.98	0.54	2.07	0.56	3.04	0.62	2.93	0.57		
I try to anticipate information in the text.	2.12	0.64	2.20	0.69	3.18	0.79	2.86	0.63	*	0.41
As I read along, I check whether I anticipated information correctly.	2.14	0.63	2.19	0.64	2.99	0.56	2.32	0.50	*	1.20
I set goals for reading (e.g. studying for a multiple-choice test, reading for a research paper).	2.37	0.75	2.30	0.69	3.82	0.68	3.00	0.71		1.15
I search out information relevant to my reading goals.	2.98	0.70	2.90	0.67	3.38	0.57	3.44	0.56		
I evaluate whether what I am reading is relevant to my reading goals.	2.22	0.58	2.21	0.56	3.56	0.68	3.29	0.73	*	0.37
I vary my reading style depending on my reading goals.	1.98	0.54	2.00	0.56	3.09	0.69	2.76	0.52	*	0.48
After I have read a text I summarise it.	3.54	0.71	3.50	0.69	3.62	0.58	3.52	0.57		

Practical significance: *d* = 0.2 (small effect size); *d* = 0.5 (medium effect size); *d* = 0.8 (large effect size).

* *P* < 0.05.

Table 4

The reading strategy use profile of first-year students: Successful vs. at risk (Posttest)

Variables	Experimental (At risk) (<i>N</i> = 25)		Control (At risk) (<i>N</i> = 15)		<i>P</i>	<i>d</i>	Experimental (Success) (<i>N</i> = 64)		Control Success (<i>N</i> = 27)		<i>P</i>	<i>D</i>
	M	S.D.	M	S.D.			M	S.D.	M	S.D.		
I briefly skim the text before reading.	3.45	0.68	2.89	0.62	*	0.82	3.72	0.71	3.12	0.67	*	0.85
I relate important points in the text to one another.	3.79	0.72	2.52	0.60	*	1.76	3.84	0.71	2.80	0.63	*	1.46
I generate questions about the text.	3.56	0.66	2.77	0.59	*	1.20	3.61	0.74	2.90	0.64	*	0.99
While I am reading, I reconsider and revise my prior questions about the text based on the text's content.	2.96	0.47	2.38	0.45	*	1.23	2.90	0.63	2.45	0.60	*	0.71
I plan how I am going to read a text.	3.59	0.57	3.29	0.55	*	0.53	3.65	0.73	3.35	0.69	*	0.41
I usually make predictions as to what will follow next.	2.70	0.48	2.00	0.42	*	1.46	2.85	0.64	2.05	0.60	*	1.25
When appropriate, I try to visualize the descriptions in order to remember.	3.40	0.60	2.91	0.57	*	0.82	3.31	0.71	3.35	0.73	n.s.	
When I don't comprehend, I change my reading strategies (e.g. re-reading).	3.77	0.68	3.21	0.63	*	0.82	3.86	0.80	3.52	0.76	*	0.43
After I have read a text, I evaluate what I have read.	3.60	0.69	3.38	0.62	*	0.32	3.89	0.78	3.49	0.71	*	0.51
I try to anticipate information in the text.	3.00	0.52	2.74	0.48	*	0.50	3.23	0.70	2.92	0.56	*	0.44
As I read along, I check whether I anticipated information correctly.	2.91	0.48	2.24	0.42	*	1.40	3.02	0.67	2.39	0.57	*	0.94
I set goals for reading.	3.84	0.80	2.92	0.65	*	1.15	3.80	0.80	3.03	0.72	*	0.96
I evaluate whether what I am reading is relevant to my reading goals.	3.50	0.73	3.24	0.67	*	0.36	3.59	0.76	3.33	0.65	*	0.34
I vary my reading style depending on my reading goals.	3.66	0.61	3.41	0.58	*	0.41	3.60	0.67	3.24	0.63	*	0.54

Practical significance: *d* = 0.2 (small effect size); *d* = 0.5 (medium effect size); *d* = 0.8 (large effect size).* *P* < 0.05.

A closer analysis of the reading comprehension scores (posttest) of successful and at-risk students in the experimental and control groups indicated that the successful students in the experimental group as well as the at-risk students in the experimental group achieved statistically ($P < 0.05$), as well as practically significantly (small to large effect sizes), higher mean scores on the reading comprehension measures in comparison to the successful students as well as the at risk students in the control group (cf. Table 5). A positive aspect related to the results is the fact that the at-risk students in the experimental group showed a significant increase in both their reading comprehension scores and in their use of reading strategies. It also seemed as if they were starting to pay attention to the metacognitive aspects of their reading (e.g., “After I have read a text, I evaluate what I have read”, “When I don’t comprehend, I change my reading strategies”).

It is also possible that the students’ comprehension of content knowledge and concepts (i.e., related to Communication Studies) was facilitated through graphic illustrations on the web pages, which helped to consolidate and concretize abstract content-based concepts by encouraging multi-modal processing of both visual and verbal cues as presented on the Internet page. This aspect would, therefore, have accommodated those students with a visual learning style. Similar studies conducted with first-year students at the Potchefstroom University have indicated that the at-risk students tend to have visual learning styles which are rarely accommodated in teacher and lecture-dominated classrooms (cf. Dreyer, 1998, 2001). It is also possible that the Internet hypertext facilitated students’ learning of new information by providing access to multiple cross-references on related topics across several documents or screens, enabling a natural juxtaposition of ideas, and allowing students the freedom to access and explore these ideas at their own time and leisure without the pressure of, “I have to know this information for a test in the Communication Studies class”. At the beginning of the Strategic Reading component of the English course, the students were told that this component was meant to help them become

Table 5
A comparison of the successful and the at risk students in terms of reading comprehension scores

Reading comprehension measures	Experimental (At risk) (N = 25)		Control At risk (N = 15)		<i>P</i>	<i>d</i>	Experimental (Success) (N = 64)		Control (Success) (N = 27)		<i>P</i>	<i>d</i>
	M	S.D.	M	S.D.			M	S.D.	M	S.D.		
English (posttest)	58.44	4.43	54.80	3.29	**	0.82	67.19	4.91	61.70	4.96	***	1.10
Communication (posttest)	56.60	4.57	55.26	2.46	n.s.	0.30	65.68	5.51	59.40	3.18	***	1.14
TOEFL (Reading posttest)	25.60	5.18	21.86	3.04	*	0.72	34.29	4.36	29.88	2.97	***	1.01

Practical significance: $d = 0.2$ (small effect size); $d = 0.5$ (medium effect size); $d = 0.8$ (large effect size).

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.0001$.

effective and efficient readers for their academic majors. The attitude and the motivation of the students were very positive and the majority wanted more periods for this component. The motivational aspect can, therefore, not be ignored in the interpretation of the results.

5. Conclusion

The present findings suggest that students benefit from strategic reading instruction offered in a technology-enhanced learning environment. The integrated features of printed interactive study guide, contact sessions with the lecturer and the added value aspect of Varsite appears to have facilitated the development of students' reading comprehension and reading strategy use. The students who accessed the information technology resources available on Varsite have immediate access to a far wider variety of texts than is available in the university library. The students can also access these resources at their own time and within the comfort of their own rooms at the residence or at home. University students need to recognise more fully that developing and applying reading strategies could improve their reading comprehension in their content subjects and, therefore, also their academic performance.

However, students can't be expected to acquire successful reading strategies incidentally, yet many come to our classes without a full realisation of what is expected of them. These students consequently continue to use inappropriate strategies with no awareness of the limitations of their habitual way of reading and learning or more productive options for completing academic tasks.

We must actively seek and share practices with colleagues that will help our students identify the obstacles that restrict their possibilities in university and equip all of the unique learners who fill our classes with the knowledge and strategies to take action toward transforming that which limits them.

Appendix

- Outcomes and an outline of the content of the interactive study guide
- Outcomes
- Students should be able to:
 - Identify and plan the readings demands of the task;
 - Formulate a purpose for their reading;
 - Formulate appropriate questions to guide their reading;
 - Select the most effective reading technique and reading rate for the identified purpose;
 - Apply the most effective and efficient reading strategy/strategies to their reading;
 - Read with comprehension at a level appropriate for first-year students;
 - Monitor their comprehension; and
 - Regulate their strategies if comprehension should break down.

Content

- What is an active reader?
- Reading purposes
- Reading stances
- Reading strategies as part of a reading process
- Asking beginning questions
- Setting a purpose by getting an overview or surveying
- Activating personal knowledge
- Making global predictions
- Read, check comprehension, reflect, think critically, monitor for difficulties and adjust
- Recite
- Review
- Reading strategies in action
- Before reading
- During reading
- After reading

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